

RECEIVED
CENTRAL FAX CENTER

SEP 21 2009

Appl. No. 10/553019

Reply to final Office Action dated 5/20/2009

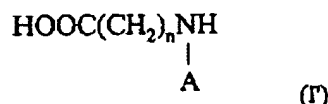
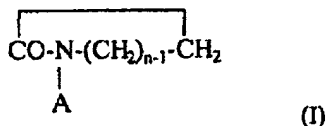
AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1-10. (Cancelled).

11. (Currently Amended) A toughened nylon, comprising: that comprises a matrix nylon; and a long-chain nylon, the matrix nylon is prepared by [[the]] homopolymerization or copolymerization of cyclic lactam monomers or their corresponding amino acids, the structure of said cyclic lactam is represented by Formula (I) and the structure of said amino acid is represented by Formula (I');



in Formula (I) and (I') A is ~~H or~~ an alkyl group including [[with]] 1-8 carbon(s) [[carbon]] and $3 \leq n \leq 11$;

the long-chain nylon is selected from the group consisting of one or more following nylons: nylon-1010, nylon-1111, nylon-1212, nylon-1313, nylon-46, nylon-66, nylon-610, nylon-612, nylon-613, nylon-1011, nylon-1012, nylon-1213, nylon-8, nylon-9, nylon-11, nylon-12, nylon-13, poly(2,2,4-trimethyl hexamethylene terephthalamide) ~~poly(telephthaloyl 2,2,4-trimethyl hexamethylene diamine)~~, poly(3-t-butyl-hexanedioyl heptamethylene-diamine), co-condensation nylon 6/7, co-condensation nylon 6/10, co-condensation nylon 6/12, co-condensation nylon 6/13, co-condensation nylon g 10/11, co-condensation nylon 10/12, co-condensation nylon 12/13, nylon-6T and nylon-10T; and

Appl. No. 10/553019

Reply to final Office Action dated 5/20/2009

the proportion of said long-chain nylon in the total weight of the toughened nylon is 2-45%; as the toughened nylon has only one melting peak detected with differential scanning calorimetry.

12. (Currently Amended) ~~[[A]]~~ The toughened nylon according to claim 11, wherein the proportion of said long-chain nylon in the total weight of the toughened nylon is 6-25%.

13. (Currently Amended) ~~[[A]]~~ The toughened nylon according to claim 11, wherein said cyclic lactam monomer is selected from the group consisting of one or more following monomers: butanolactam, pentanolactam, hexanolactam, heptanolactam, octanolactam, nonanolactam, decanolactam, undecanolactam, dodecanolactam, N-methyl hexanolactam, N-n-octyl nonanolactam, and N-t-butyl dodecanolactam; and

said corresponding amino acid is selected from the group consisting of ω -amino butanoic acid, ω -amino pentanoic acid, ω -amino hexanoic acid, ω -amino ~~heptanoic~~ heptanoic acid, ω -amino octanoic acid, ω -amino nonanoic acid, ω -amino decanoic acid, ω -amino undecanoic acid ~~[[or]]~~ and ω -amino dodecanoic acid.

14. (Currently Amended) A preparation process of toughened nylon according to claim 11, ~~wherein the steps of process are as follows comprising:~~

dissolve dissolution step of said long-chain nylon resin in said lactam monomer or its corresponding amino acid; and

a ~~[[the]]~~ polymerization step of said lactam monomer or its corresponding amino acid ~~is carried out;~~

wherein the dissolution step and the polymerization step ~~may be~~ are conducted simultaneously, or wherein the dissolution step is performed ~~dissolve at first~~ and then the early out polymerization step is carried out in ~~[[the]]~~ a solution obtained from the dissolution step.

15. (Currently Amended) ~~[[A]]~~ The process according to claim 14, wherein said polymerization step includes ~~may be carried out with any process as casting, reacting extrusion, hydrolysis polymerization, or solid phase polymerization.~~

Appl. No. 10/553019

Reply to final Office Action dated 5/20/2009

16. (Currently Amended) ~~[[A]]~~ The process according to claim 15, further comprising wherein the following steps are conducted:

dissolving ~~dissolve~~ said long-chain nylon resin in melted cyclic lactam monomer or its corresponding amino acid;

dehydrating ~~dehydrate~~;

then adding ~~[[add]]~~ catalyst and dehydrate again, raising ~~[[raise]]~~ temperature to 120-200°C and adding ~~[[add]]~~ catalyst promoter;

transferring ~~transfer~~ in a preheated mould immediately and carrying ~~[[carry]]~~ out polymerization in an oven at 150-250°C to obtain the toughened nylon.

17. (Currently Amended) ~~[[A]]~~ The process according to claim 15, further comprising wherein the following steps are conducted:

in a first reactor, adding ~~[[add]]~~ and dissolving ~~dissolve~~ said long-chain nylon resin in cyclic lactam monomer or its corresponding amino acid ~~in a reactor~~;

dehydrating ~~dehydrate~~ in vacuum contents in the first reactor;

in the first reactor, adding ~~[[add]]~~ catalyst and continue dehydrating ~~to dehydrate~~ in vacuum;

in a second ~~another~~ reactor, adding ~~[[add]]~~ cyclic lactam monomer or its corresponding amino acid and catalyst promoter, and ~~dehydrating~~ in vacuum; ~~[[.]]~~

then adding ~~add the~~ contents of ~~[[two]]~~ the first and the second reactors into an extruder for polymerization; and

setting ~~[[set]]~~ the temperature of polymerization section at 220-250°C and adjusting ~~adjust~~ screw speed so that ~~[[the]]~~ residence time of material in screw is 0.5-7 minutes, and toughened nylon is obtained as extruded product.

18. (Currently Amended) ~~[[A]]~~ The process according to claim 15, further comprising wherein the following steps are conducted:

adding ~~[[add]]~~ said long-chain nylon resin to cyclic lactam monomer or its corresponding amino acid; ~~[[.]]~~

heating ~~[[heat]]~~ and dissolving ~~dissolve~~; ~~[[.]]~~

Appl. No. 10/553019

Reply to final Office Action dated 5/20/2009

adding ~~[[add]]~~ water and conducting ~~conduct~~ hydrolysis polymerization at 200-250°C and 10-20 MPa; ~~[[,]]~~

depressurizing ~~depressurize~~ after 0.5-6 hours and dehydrating ~~dehydrate~~ in vacuum; and continuing ~~continue~~ polymerization for further increasing viscosity and then to obtain the toughened nylon ~~is obtained~~.

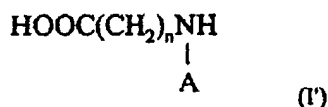
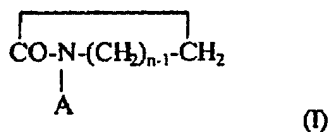
19. (Previously Presented) The application of toughened nylon prepared according to claim 11 in the manufacture of gears, bearings, precise instrumental parts and automobile parts.

20. (Currently Amended) A toughened nylon, comprising: ~~that comprises~~

a matrix nylon; and

a long-chain nylon,

the matrix nylon is prepared by the homopolymerization or copolymerization of cyclic lactam monomers or their corresponding amino acids, the structure of said cyclic lactam is represented by Formula (I) and the structure of said amino acid is represented by Formula (I');



in Formula (I) and (I') A is ~~H or~~ an alkyl group including ~~[[with]]~~ 1-8 carbon(s) ~~[[carbon]]~~ and $3 \leq n \leq 11$;

in Formula (I) and (I') A is ~~H or~~ alkyl with 1-8 carbon and $3 \leq n \leq 11$;

the long-chain nylon is selected from the group consisting of ~~one or more following~~ ~~nylons:~~ nylon-1010, nylon-1111, nylon-1212, nylon-1313, nylon-46, nylon-66, nylon-610, nylon-612, nylon-613, nylon-1011, nylon-1012, nylon-1213, nylon-8, nylon-9, nylon-11, nylon-12, nylon-13, poly(2,2,4-trimethyl hexamethylene terephthalamide) ~~poly(terephthaloyl-2,2,4-trimethyl hexamethylene diamine)~~, poly(3-t-butyl-hexanedioyl heptamethylene-diamine), co-condensation nylon 6/7, co-condensation nylon 6/10, co-condensation nylon 6/12, co-

Appl. No. 10/553019

Reply to final Office Action dated 5/20/2009

condensation nylon 6/13, co-condensation nylon 10/11, co-condensation nylon 10/12, co-condensation nylon 12/13, nylon-6T and nylon-10T; and

[[this]] the toughened nylon is prepared by the polymerization of said cyclic lactam monomer or their corresponding amino acids in the existence of said long-chain nylon as toughening agent, wherein ~~the~~ proportion of said long-chain nylon used as toughening agent in the total weight of toughened nylon is 2-45%.

21. (Currently Amended) [[A]] The toughened nylon according to claim 20, wherein the proportion of said long-chain nylon used as toughening agent in the total weight of toughened nylon is 6-25%.

22. (Currently Amended) [[A]] The toughened nylon according to claim 20, wherein said cyclic lactam monomer is selected from the group consisting of one or more following monomers: butanolactam, pentanolactam, hexanolactam, heptanolactam, octanolactam, nonanolactam, decanolactam, undecanolactam, dodecanolactam, N-methyl hexanolactam, N-n-octyl nonanolactam, and N-t-butyl dodecanolactam; and

said corresponding amino acid is selected from the group consisting of ω -amino butanoic acid, ω -amino pentanoic acid, ω -amino hexanoic acid, ω -amino ~~heptanoic~~ heptanoic acid, ω -amino octanoic acid, ω -amino nonanoic acid, ω -amino decanoic acid, ω -amino undecanoic acid [[or]] and ω -amino dodecanoic acid.

23. (Currently Amended) A preparation process of toughened nylon according to claim 20, wherein the steps of process are as follows comprising:

dissolution step of dissolve said long-chain nylon resin in said lactam monomer or its corresponding amino acid; and

a [[the]] polymerization step of said lactam monomer or its corresponding amino acid ~~is carried out~~;

wherein the dissolution step and the polymerization step ~~may be~~ are conducted simultaneously, or wherein the dissolution step is performed ~~dissolve at first~~ and then ~~carry out~~ the polymerization step is carried out in [[the]] a solution obtained from the dissolution step.

Appl. No. 10/553019

Reply to final Office Action dated 5/20/2009

24. (Currently Amended) ~~[[A]] The process according to claim 23, wherein said polymerization step includes may be carried out with any process as casting, reacting extrusion, hydrolysis polymerization or solid phase polymerization.~~

25. (Currently Amended) ~~[[A]] The process according to claim 24, further comprising wherein the following steps are conducted:~~

~~dissolving~~ dissolve said long-chain nylon resin in melted cycle lactam monomer or its corresponding amino acid;

~~dehydrating~~ dehydrate;

then adding a ~~[[add]]~~ catalyst and dehydrate again, raising ~~[[raise]]~~ temperature to 120-200°C and adding a ~~[[add]]~~ catalyst promoter;

transferring ~~transfer~~ in a preheated mould immediately and carrying ~~[[carry]]~~ out polymerization in an oven at 150-250°C to obtain the toughened nylon.

26. (Currently Amended) ~~[[A]] The process according to claim 24, further comprising wherein the following steps are conducted:~~

in a first reactor, adding ~~[[add]]~~ and ~~dissolving~~ dissolve said long-chain nylon resin in cyclic lactam monomer or its corresponding amino acid ~~in a reactor~~;

dehydrating ~~dehydrate~~ in vacuum contents in the first reactor;

in the first reactor, adding a ~~[[add]]~~ catalyst and continuing the dehydrating ~~continue to dehydrate~~ in vacuum;

in ~~another~~ a second reactor, adding ~~[[add]]~~ cyclic lactam monomer or its corresponding amino acid and catalyst promoter, and ~~and~~ dehydrating in vacuum; ~~[[.]]~~

adding ~~add~~ the contents of ~~[[two]]~~ the first and the second reactors into an extruder for polymerization; and

setting ~~set~~ the temperature of polymerization section at 220-250°C and adjusting ~~[[adjust]]~~ screw speed so that ~~[[the]]~~ residence time of material in screw is 0.5-7 minutes, and toughened nylon is obtained as extruded product.

27. (Currently Amended) ~~[[A]] The process according to claim 24, further comprising wherein the following steps are conducted:~~

Appl. No. 10/553019

Reply to final Office Action dated 5/20/2009

adding ~~[[add]]~~ said long-chain nylon resin to cyclic lactam monomer or its corresponding amino acid; ~~[[,]]~~

heating ~~[[heat]]~~ and dissolving ~~dissolve~~; ~~[[,]]~~

adding ~~[[add]]~~ water and conducting ~~conduct~~ hydrolysis polymerization at 200-250°C and 10-20 MPa; ~~[[,]]~~

depressurizing ~~depressurize~~ after 0.5-6 hours and dehydrating ~~dehydrate~~ in vacuum; and continuing ~~continue~~ polymerization for further increasing viscosity ~~and then to obtain the toughened nylon is obtained.~~

28. (Previously Presented) The application of toughened nylon prepared according to claim 20 in the manufacture of gears, bearings, precise instrumental parts and automobile parts.

29. (New) The process according to claim 14, wherein said polymerization step includes reacting extrusion.

30. (New) The process according to claim 14, wherein said polymerization step includes hydrolysis polymerization.

31. (New) The process according to claim 14, wherein said polymerization step includes solid phase polymerization.

32. (New) The process according to claim 23, wherein said polymerization step includes reacting extrusion.

33. (New) The process according to claim 23, wherein said polymerization step includes hydrolysis polymerization.

34. (New) The process according to claim 23, wherein said polymerization step includes solid phase polymerization.